Log Event B

Borehole # 41-04-05

Borehole Information

Farm : SX	**Tank :** SX-104	**Site Number :** 299-W23-198
N-Coord : 35,412	**W-Coord :** 75,639	**TOC Elevation :** 663.00
Water Level, ft :	**Date Drilled :** 11/14/1974	

Casing Record

Type : Steel-welded	Thickness : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 100	

Borehole Notes:

Borehole 41-04-05 was drilled in November 1974 to a depth of 100 ft with 6-in. casing. The casing thickness is presumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. steel tubing. Data from the drilling log and Chamness and Merz (1993) were used to provide borehole construction information. Although no information concerning grouting or perforations was available, it is assumed that the borehole was not grouted or perforated since this was not a routine practice during the early 1970s drilling campaign.

Equipment Information

Logging System : 1	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 10/1997	**Calibration Reference :** GJO-HAN-20	**Logging Procedure :** MAC-VZCP 1.7.10-1

Logging Information

Log Run Number : 1	**Log Run Date :** 01/16/1998	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 100.0	**Counting Time, sec.:** 50	**L/R :** L **Shield :** N
Finish Depth, ft. : 0.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

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Logging Operation Notes:

This borehole was logged by the SGLS in a single log run. The top of the casing, which is the zero reference for the SGLS, is assumed to be approximately flush with the ground surface. The top of the casing elevation was not available; therefore, the elevation was estimated from information provided in Brevick et al. (1994). The total logging depth achieved was 100 ft. The 50-s counting time used to log this borehole was half of that normally required because this is a repeat log that was run to determine if there has been any changes in the vadose zone contamination.

Analysis Information

Analyst : E. Larsen

Data Processing Reference : MAC-VZCP 1.7.9 Analysis Date : 02/05/1998

Analysis Notes :

The pre-survey and post-survey field verification for the logging run met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from the accepted calibration spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

The casing correction factor for a 0.33-in.-thick steel casing was applied during the analysis of the data collected from the initial logging event in 1995 (Event A). However, a casing correction factor for a 0.280-in.-thick steel casing was applied during analysis of the data collected from the most recent logging event (Event B) because it is thought to be more accurate. Consequently, the reported activities calculated for Event A were slightly higher than those calculated for Event B. To determine if a change in radionuclide concentrations had occurred between 1995 and 1998, the new data were also processed using the 0.33-in. casing correction and used for comparison with the old data set. No change was found.

Shape factor analysis provides insights into the distribution of the Cs-137 contamination and into the nature of zones of elevated total count gamma-ray activity not attributable to gamma-emitting radionuclides. A 50-s counting time used during the most recent logging event resulted in counting statistics that were inadequate to produce reliable shape factor results. Therefore, spectra collected from the initial logging event in 1995, which utilized a 100-s counting time, were used to generate shape factor results for this borehole.

Log Plot Notes:

A data plot is presented that compares the SGLS data collected during the baseline logging event (Event A) in May 1995 with the SGLS data collected during the subsequent monitoring event (Event B) in January 1998. The man-made radionuclide data and the total gamma activity derived from the spectral data from each event are used in the data comparison. Uncertainty bars and MDLs are not included on these plots.

A separate log plot shows the variations in the volumetric moisture content of the sediments surrounding this borehole. Uncertainty bars on the plot show the counting uncertainties for selected measurements as the 1-sigma (68%) confidence intervals.

A plot of the spectrum shape factors is also presented. The plot is used as an interpretive tool to help determine the radial distribution of man-made contaminants around the borehole.

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A combination plot includes the SGLS man-made and natural radionuclide data and the total gamma activity derived from the spectral data. Also included is the profile of the volumetric moisture content derived from the neutron count-rate data.

Results/Interpretations:

As described previously, the 1998 SGLS data were collected using a 50-s counting time, which is half of that normally used. This resulted in a MDL that was higher than the MDL associated with the baseline log data collected in 1995. Consequently, some regions of very low Cs-137 contamination between 22 and 90 ft that were detected in 1995 were not detected in 1998. Accordingly, the distribution of the man-made radionuclide contamination detected by the SGLS in 1995 is discussed below.

The man-made radionuclide Cs-137 was detected in this borehole. The Cs-137 contamination was detected continuously from the ground surface to a depth of 17 ft. Isolated occurrences of Cs-137 were detected between 22 and 90 ft and at the bottom of the logged interval (99.5 to 100 ft).

The comparison of the 1995 and 1998 SGLS data shows excellent repeatability of the Cs-137 contamination profile in the upper 17 ft of the backfill material. It appears that the concentrations of Cs-137 have decreased slightly between 1995 and 1998, possibly illustrating the expected radioactive decay of the Cs-137 in this region. There is no indication of an increase in contamination in the vadose zone sediments surrounding this borehole since 1995; thus, there is no indication of a tank leak in this region.

Additional information and interpretations of the log data are provided in the Tank Summary Data Report and Vadose Zone Reassessment Report for tank SX-104.